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New Evidences Regarding the Existence of Segregation Distortion Factors Associated to the Genes Controlling the Low-Gossypol Seed and High-Gossypol Plant Trait of *Gossypium sturtianum*

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Two hundred and fourteen mapped SSR markers evenly distributed on the 26 chromosomes of *Gossypium hirsutum* L. were used to monitor the introgression and conservation of SSR loci (alleles) coming from the Australian wild species *G. sturtianum* in selected progenies of the trispecies hybrid [(*G. hirsutum* x *G. raimondii*)² x *G. sturtianum*] (HRS). Among the 93 *G. sturtianum*-specific SSR revealed in the triple hybrid, only ten mapped on c2-c14, c3-c17, and c6-c25 linkage groups were still present in the most advanced generations obtained (HRS BC₂S₆ and S₁/BC₁/BC₂S₂). In order to understand the genetic determinism of the glanded-plant and glandless-seed trait, selfed and backcrossed progenies to *G. hirsutum* of a HRS S₁/BC₁/BC₂S₂ plant expressing this character were analysed using GISH (carried out on mitotic root cells) and SSR polymorphic markers. *In situ* hybridization results indicated the presence of four entire and two recombined chromosomes of *G. sturtianum* in the genome of three plants issued from almost gossypol-free seeds obtained by selfing the selected S₁/BC₁/BC₂S₂ mother plant. SSR analysis put in evidence the heterozygous state of most of the *G. sturtianum*-specific SSR in the selfed progeny produced from the selected plant and the preferential transfer of some of the *G. sturtianum* DNA fragments either through the ovule or the pollen. Besides the presence of *G. sturtianum* gametocidal genes, the data obtained let suppose the existence of lethality factor(s) on the conserved alien fragments which are expressed in homozygous state and/or post zygotic lethality due to genetic interaction of specific *G. sturtianum* allele(s) with *G. hirsutum* genetic background. The association of these segregation distortion factors to the genes of *G. sturtianum* controlling the gossypol inhibition synthesis only in the seed constitutes a major constraint to the development through interspecific hybridization of commercial cotton varieties presenting very low gossypol content in the seed and high terpenoid aldehyde rate in the aerial parts of the plant.